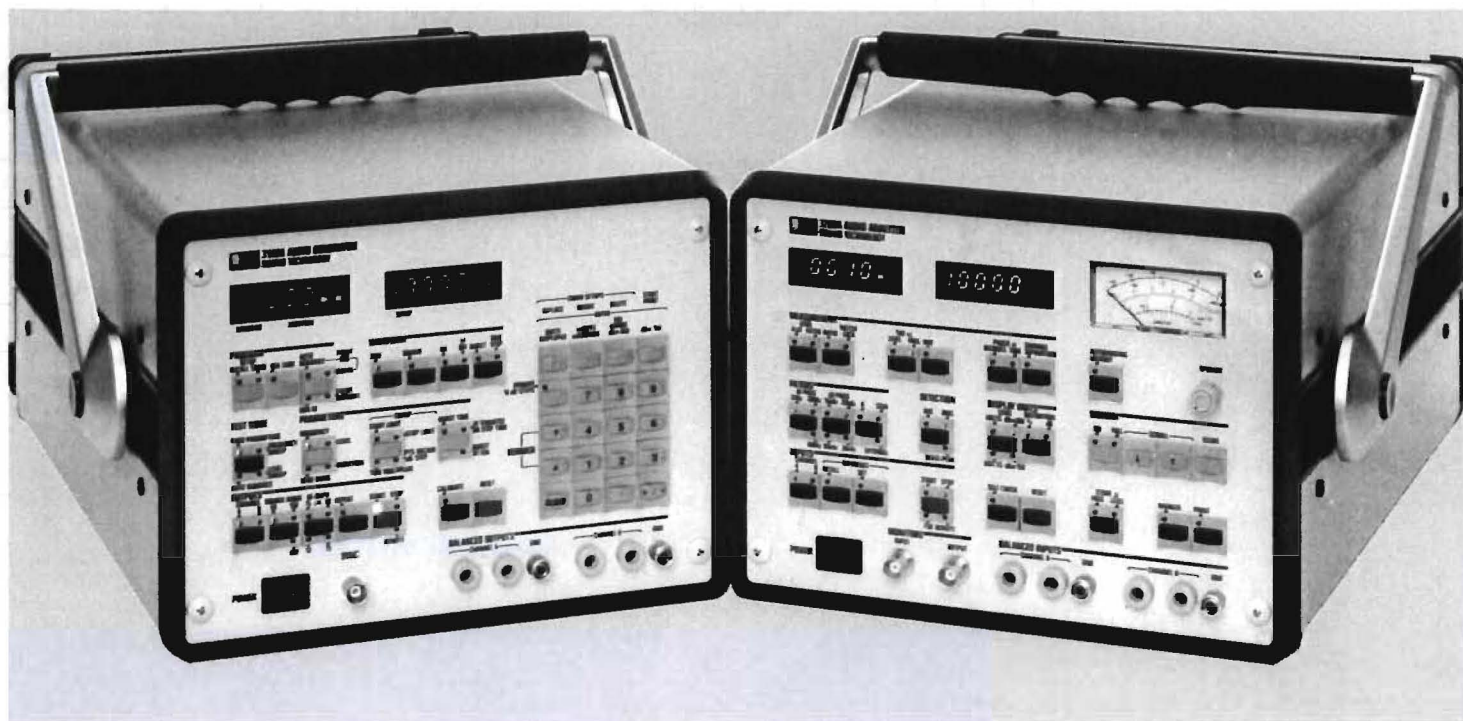


# 3000 SERIES PROGRAMMABLE TRANSMISSION/ AUDIO TEST SYSTEM SOUND TECHNOLOGY

Programmable • Portable • High-performance



These instruments have the following exclusive features:

communications protocols:



**AUTOMATIC.** Exclusive FSK communication allows automatic remote testing (without modems or computers).

**COMPREHENSIVE.** Complete audio testing including *graphic and tabular printouts* without using a computer.

**INTERNALLY-PROGRAMMABLE.** Store and chain up to 80 different front panel set-ups into 16 different proof locations.

**INDUSTRY-LEADING SPECIFICATIONS.** Will test the best 16-bit digital systems!

**COMPREHENSIVE WAVEFORMS.** 3100A Generator outputs precise Sinewaves, Squarewaves, SMPTE-IMD\*, Tone-burst\* and Sine/Step\* waveforms.

\* Optional



**SOUND TECHNOLOGY**

Represented by  
Atlantic Marketing  
Charlotte, NC  
(704) 542-3380

# SPECIFICATIONS

## 3100A PROGRAMMABLE AUDIO GENERATOR

### Sinewave, Toneburst, Sine/Step

Minimum Frequency: 1 Hz (10 Hz during automatic sweep or panel recall)  
Maximum Frequency: 102.39 kHz  $\pm$  4% Vernier  
Frequency Accuracy: .03% fixed parameters  
.1% automatic sweep  
Frequency Resolution: .01% 10 Hz to 102.39 kHz  
Frequency Sweep: User selectable 4 to 255 pts/decade, internally calculated to provide linear increments on a log-frequency scale; start and stop frequencies selectable from 10 Hz to 102.39 kHz. Sweeps up or down.  
Level Sweep: User selected end points in dBm (600 or 150). dB/STEP keyed-in .05 dB to 20.00 dB. Sweeps up or down.

### Squarewave

Minimum Frequency: 1 Hz  
Maximum Frequency: 50 kHz  
Risetime: less than 1  $\mu$ sec, controlled by 3-pole, linear phase filter.

### SMPTE IMD (option 004)

IMD Residual Distortion: < .001%

### Toneburst (option 005)

Toneburst Time On/Off adjust: 5 msec to 9,999.9 sec.  
Toneburst Off adjust: burst off set from 5 to 60 dB in 5 dB increments

### Sine/Step (option 005)

Sine/step Sine On/Step On adjust: 5 msec to 9,999.9 sec.

### General

Maximum Output: 30.65 dBm/600  $\Omega$  load  
Balanced or 30.00 dBm/both channels loaded  
Unbalanced) 30.00 dBm/150  $\Omega$  load  
24.00 dBm/150  $\Omega$ , both channels loaded

Maximum open circuit voltage: 28.6  
Minimum Level: -90 dBm (24.5  $\mu$ V)  
THD at Maximum Output: < .0008% to 10 Hz to 20 kHz  
< .0015% to 50 kHz  
.008% to 100 kHz

10 Hz to 20 kHz Flatness: 0.1 dB; .15 dB to 100 kHz

Level Accuracy at Mid-band: 0.2 dB

Level Resolution: .05 dB

600  $\Omega$  Source Resistance Tolerance:  $\pm$  0.5% (-0.35% both channels loaded)\*

150  $\Omega$  Source Resistance Tolerance:  $\pm$  2% (-5.6% both channels loaded)\*

50  $\Omega$  Source Resistance Tolerance:  $\pm$  3%

Selectable Load Resistance: Key-in 50  $\Omega$  to 99,999 k $\Omega$

Number of Channels: 2

Balance: > 120 dB (Floating, DC coupled)

Separation: > 100 dB to 20 kHz, > 80 dB to 100 kHz

Sync Output: 5 V positive-going squarewave - follows (Ground Lo Freq on IMD and Burst Envelope on Referenced Burst or Sine/Step

De-emphasis: 10  $\mu$ sec, 25  $\mu$ sec, 50  $\mu$ sec or 75  $\mu$ sec. (option 006) Applies to all functions

De-emphasis Accuracy: .02 dB

Power: 100, 120, 220, 240 V, 48-66 Hz, 70 W.

Dimensions: HWD: 8.0  $\times$  10.1  $\times$  17.4" (20  $\times$  26  $\times$  44 cm). (Handle adds additional 2.0" (5 cm) to width).

Weight: Net/Ship: 30.25 lbs (13.75 kg) / 38 lbs (17.25 kg).

Environmental: 90% RH, +50 to +104° F (+ 10 to + 40° C).

\* Output Level is automatically corrected for 2-channel loading.

## 3200A PROGRAMMABLE TRANSMISSION/AUDIO ANALYZER

### Level, Flat or Filtered

Units: Volts, dBm 600, dBm 150, Watts (8 $\Omega$ )  
Bandwidth: > 300 kHz  
Ranges: 30  $\mu$ V to 100 V, Autoranging  
Filtered: one each of Hi Pass and/or Lo Pass  
Common Mode Rejection: > 100 dB at 60 Hz  
Residual Noise: < 4  $\mu$ V with 80 kHz B.W.  
10  $\mu$ V with 300 kHz B.W.

### Ratio

Measures against user set reference level

Units: dB

Filters: Hi Pass, Lo Pass and Weighting selectable

### THD

Units: % or dB  
Range: .001% to 100% full scale  
Residual Distortion: < .001% 10 to 20 kHz\*  
< .002% to 50 kHz  
.008% to 100 kHz

Residual Noise: < 4  $\mu$ V with 80 kHz B.W.  
\*using 80 kHz filter

Measurement bandwidth: > 300 kHz  
Fundamental Rejection: > 10 dB below residual noise + Distortion

Accuracy:  $\pm$  1 dB to 20 kHz,  $\pm$  2 dB to 100 kHz  
Minimum Level: 30 mV

### Notch Lock (option 010)

Same as ratio except Notch Filter used. Notch auto-nulls with signals above 0.1 V, then locks-up when signal drops below 0.1 V. Time for ensuing measurement of noise in the presence of a low level signal (e.g., quantization noise): approx. 30 sec.

### IMD (SMPTE - option 004)

Residual Noise + Distortion: < .002%  
Accuracy:  $\pm$  1 dB  
Frequencies: 60 Hz, 7 kHz

### Phase

Range:  $\pm$  180.0°  
Frequency: 10 Hz to 40 kHz  
Level: 50 mV to 100 V  
Accuracy:  $\pm$  0.8°  
Resolution: 0.1°

### Channel Separation

Measures cross-talk into selected channel

Residual cross-talk: 100 dB to 20 kHz  
80 dB to 100 kHz

### General

Input Channels: 2  
Frequency Measuring Error: .01%  
Frequency Measuring Resolution: 5 digits  
Flatness: 20 Hz to 50 kHz: < 0.1 dB  
50 kHz to 100 kHz: < 0.2 dB  
10 Hz to 20 Hz: < 0.3 dB  
Crest Factor: 6  
Detectors: AVG, RMS, Q-PEAK  
LP Filters: 80 kHz, 30 kHz, 22 kHz, 15 kHz  
HP Filters: 22 Hz, 200 Hz, 400 Hz

THD Measuring Speed (Sweep, autoranging off)

at 10 Hz - 5.0 seconds/reading  
at 100 Hz - 1.25 seconds/reading  
at 1 kHz and above - 1.0 seconds/reading

Amplitude Measuring Speed (Sweep, autoranging off)

at 10 Hz - 2.5 seconds/reading  
at 100 Hz - 650 msec/reading  
at 1 kHz and above - 500 msec/reading  
(Double above times for "autoranging ON")

Power: 100, 120, 220, 240 V, 48-66 Hz, 70 W.

Dimensions: HWD: 8.0  $\times$  10.1  $\times$  17.4" (20  $\times$  26  $\times$  44 cm). (Handle adds additional 2.0" (5 cm) to width).

Weight: Net/Ship: 26.5 lbs (12 kg) / 36 lbs (16.5 kg).

Environmental: 90% RH, +50 to +104° F (+ 10 to + 40° C).



### SOUND TECHNOLOGY

1400 DELL AVENUE  
CAMPBELL, CALIFORNIA 95008  
TELEX: 357445  
(408) 378-6540

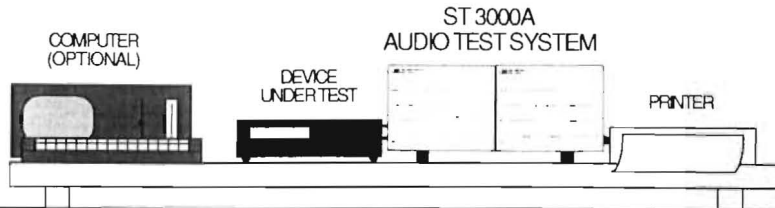


## SYSTEM FLEXIBILITY

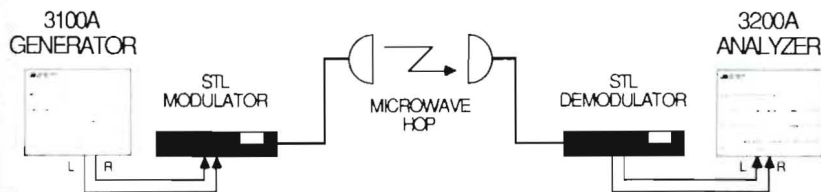
Sound Technology designed the 3000 series instruments with *flexibility* in mind. The ability to configure the system as a separate Generator and Analyzer allows for easy (and cost effective) remote testing. Impromptu *automated remote testing* is easy because

of ST's use of FSK automation. No computers, modems or phone lines are necessary. Bi-directional STL testing is also possible without the need for computers. The 3000 series also excels in bench-top testing applications.

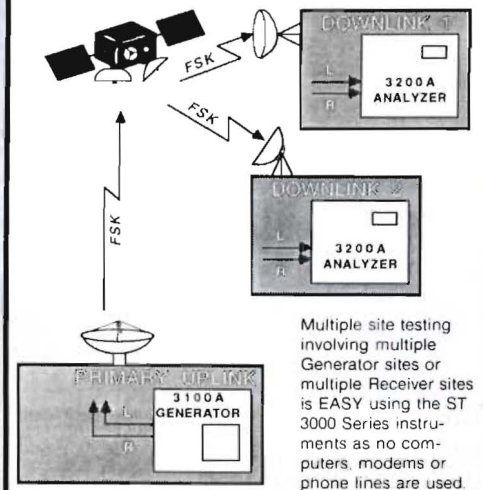
### AUTOMATED BENCHTOP TESTING



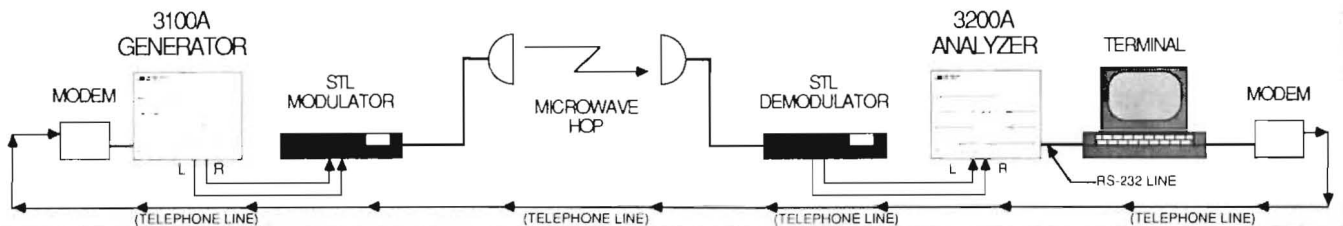
### AUTOMATED REMOTE TESTING (STL EXAMPLE SHOWN)



### MULTIPLE SITE TESTING



### AUTOMATED REMOTE TESTING: UNMANNED GENERATOR (STL EXAMPLE SHOWN)



## OPTIONS

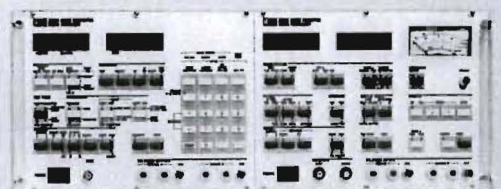
### 3100A GENERATOR

- Option 002 ..... Rackmount Mainframe.
- Option 004 ..... SMPTE-IMD waveform. Intermodulation Distortion (waveform per SMPTE method of 7kHz on 60Hz at 1:4 ratio).
- Option 005 ..... Special Functions Group. User-definable Toneburst and Sine/Step waveforms. Allows for dynamic testing of audio systems using Toneburst and of narrow-band transmission systems using Sine/Step waveforms.
- Option 006 ..... De-emphasis Group. User selectable 75, 50, 25 and 10 micro-second de-emphasis curves for Broadcast proofs. Allows for de-emphasized fixed frequencies or frequency sweeps.
- Option 008 ..... Rugged Flight Case.
- Option 009 ..... GPIB Computer Interface. Industry standard IEEE-488 computer interface bus. (RS-232C interface and Centronics printer port standard).

### 3200A ANALYZER

- Option 002 ..... Rackmount Mainframe.
- Option 004 ..... IMD Analysis capability. As per SMPTE method.
- Option 008 ..... Rugged Flight Case.
- Option 010 ..... Notch Lock. Option for digital audio measurement. Allows for quantizing noise and distortion measurements. Locks-up normally auto-ranging notch filter for measurements in the presence of low level signals.
- Option 011 ..... Graphics Printout. Print out test results in graphic format directly from the Analyzer to an Epson™/compatible printer.

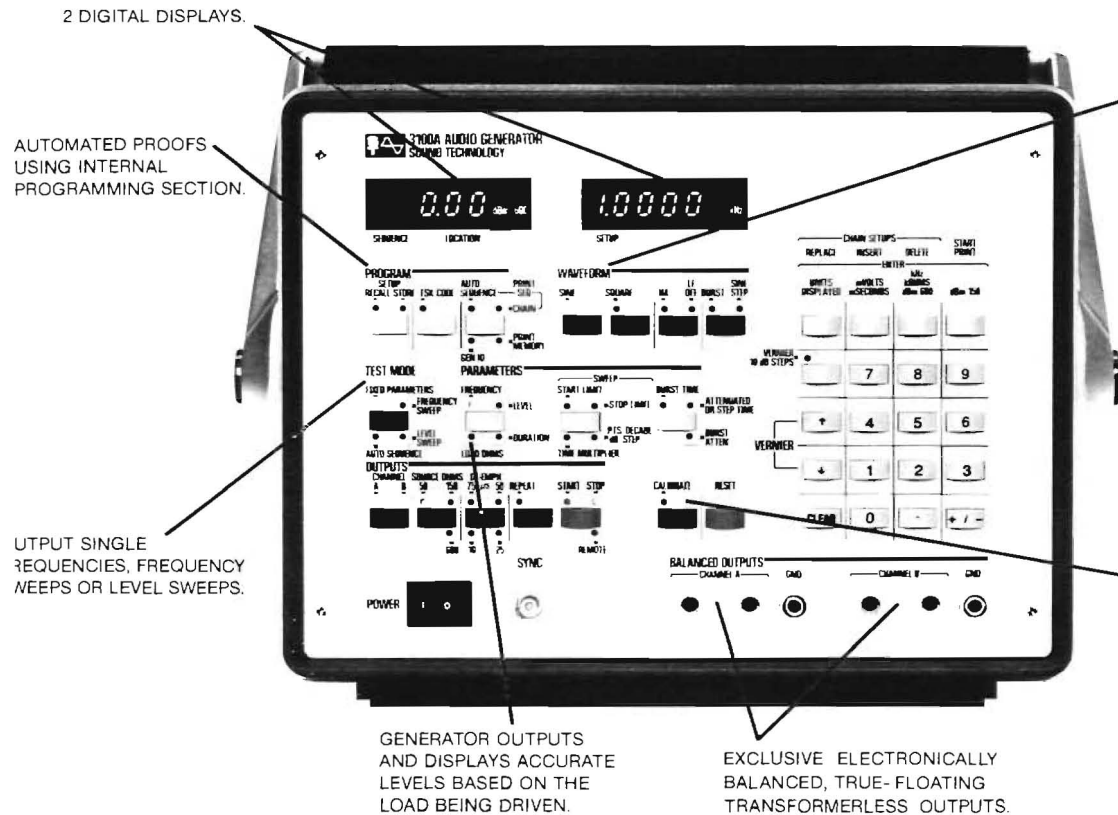
## MECHANICAL



The 3000A Audio Test System  
(Generator and Analyzer in One Mainframe)



## 3100A PROGRAMMABLE AUDIO GENERATOR



The Sound Technology 3000 Series...  
The NEW generation in audio testing!

The ST3000 Series design philosophy combines the "best of all worlds" for audio testing in one package. You can use the instruments *manually*, use *internal automation* or *externally automate* using one of the '3000 series' industry standard interface busses!

### AUTOMATED BENCH-TOP OR REMOTE TESTING

Simple bench-top operation or remote automation results from Sound Tech's unique use of FSK (frequency-shift-keying) generator-to-analyzer communication. The use of FSK, which is transmitted through the audio line(s) or circuits being tested, allows for *automation without external computers!* Up to 16 proofs or test sequences can be built into the Generator's programming section. Running a proof is as easy as recalling a two-digit number and pushing "start"!

### MANUAL MODE

Up until now, when purchasing an audio test system you had to make a choice. A choice between manual or automated testing. The conflict exists because Engineers naturally prefer a manual "mode" of operation when troubleshooting, and they prefer automation when they want to get an overall performance picture.

The solution is the 3000 Series. It excels both in manual use and under automated control. Easy to understand and use front panels make manual troubleshooting easy. Exclusive two LED displays on both the Generator and Analyzer give you twice the information of competitive systems. And, the Analyzer's exclusive *Memory Storage* section is continually storing away test results for your later use.

### MEASUREMENT SPEED

We designed the 3000 Series with an eye on optimizing the relationship between repeatable test results and measurement speed. We are proud to have achieved our goal; repeatable measurements and the following measurement acquisition times:

Midband ThD measurement	1 second
Level measurement	500 msec
Phase measurement	300 msec

These timeframes allow for running abbreviated proofs in less than 60 second time periods. More extensive proofs only take a few minutes time.

### INDUSTRY-LEADING SPECIFICATIONS

The 3000 Series was designed for testing 16-bit digital audio systems. Here are some of our specifications:

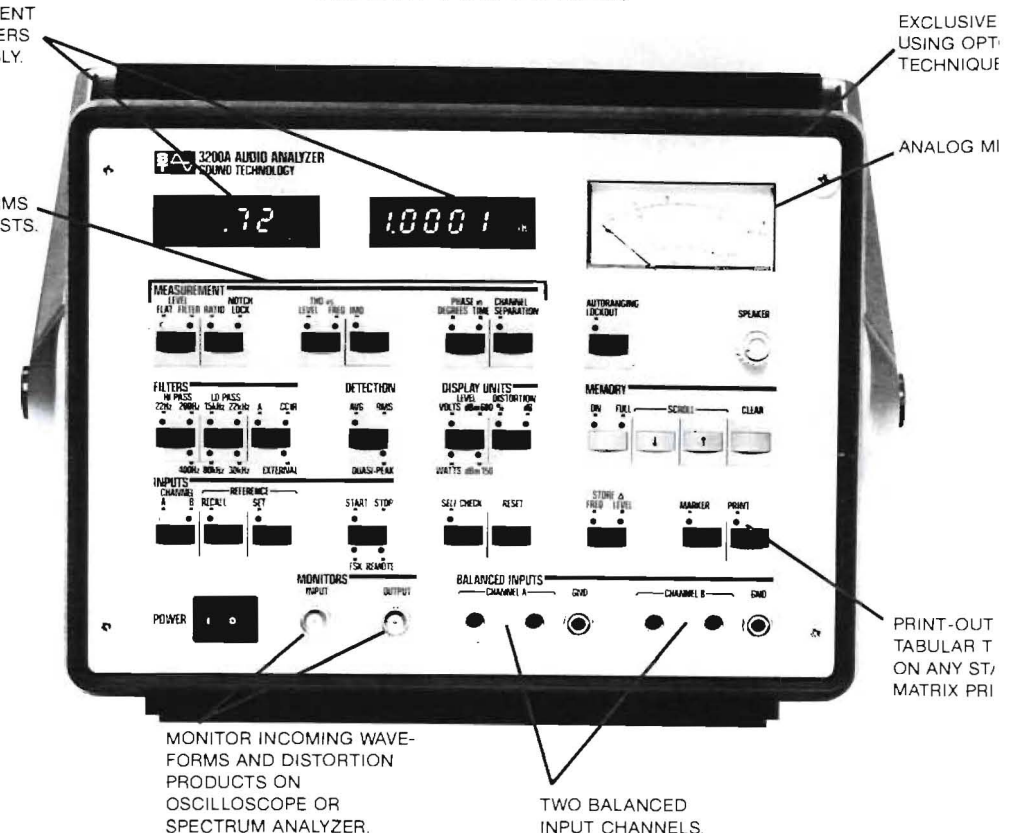
DISPLAYS PRESENT TWO PARAMETERS SIMULTANEOUSLY.

COMPREHENSIVE WAVEFORM SELECTION.

ANALYZER PERFORMS TEN DIFFERENT TESTS.

CALIBRATE FREQUENCY TO INSURE .03% ACCURACY!

## 3200A PROGRAMMABLE TRANSMISSION/AUDIO ANALYZER



MONITOR INCOMING WAVEFORMS AND DISTORTION PRODUCTS ON OSCILLOSCOPE OR SPECTRUM ANALYZER.

TWO BALANCED INPUT CHANNELS.

Gen. ThD (80 kHz LP) ..... < .001%  
Level flatness ..... < .1 dB  
Phase error tolerance ..... < 1 degree  
Residual noise (80 kHz LP) ..... < 4  $\mu$ V  
Sinewave freq. accuracy ..... < .03%  
Squarewave risetime ..... < 0.5  $\mu$ Sec  
Crosstalk 20 kHz residual ... < -100 dB

The 3000 Series specifications are some of the best to be found. We welcome comparison to any other audio test system regardless of where manufactured. Beware of confusing specification claims when shopping for a new audio test system!

### COMPREHENSIVE WAVEFORMS AND ANALYSIS

More than just a sinewave generator, the 3100A is a low distortion function generator having the following waveform capabilities:

Sinewave:	1 Hz to 102.39 kHz
Squarewave:	1 Hz to 50 kHz

SMPT-IMD:\* ..... 7 kHz on 60 Hz, 4:1  
Toneburst:\* ..... 100 Hz to 102.39 kHz  
Sine/Step:\* ..... 100 Hz to 102.39 kHz  
\* Denotes an option.

All of the above waveforms are generated by the world's best generator: a *transformerless, electronically balanced—true floating* two-channel output generator. This digitally controlled, analog oscillator runs "RF cool" as the enclosed oscillator is isolated from the multi-layered pc board digital control section using opto-isolators. There is no electrical connection between the digital control circuits and the analog oscillator—therefore, no RF or digital "hash" path to the oscillator. Engineers are amazed to sweep either the Generator or Analyzer out into the MHz regions and find no digital hash or clock frequencies in the spectrum.

Because the balanced outputs are truly floating and transformerless, you can single-end either side to ground without loss of level. Also, you can output a clean (-90 dBm) signal in order to test well below mic-line levels: the oscillator attenuates the noise as well as the signal (over 100 dB of attenuation after the power amp)!

The 3200A Analyzer is no less comprehensive. The analyzer measures the following:

- Frequency to 500 kHz
- Flat Level to 350 kHz
- Filtered Level to 350 kHz
- Ratio
- Notch Lock\*
- ThD vs. Level (300 kHz BW)
- ThD vs. Freq. (300 kHz BW)
- SMPT-IMD\*
- $\Phi$  Error in Degrees to 40 kHz
- $\Phi$  Error in Time to 40 kHz
- Channel Separation to 100 kHz

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### REM

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